

Percentages of forecasts verified, September, 1891.

State.	Weather.	Temperature.	Weather and temperature combined.	State.	Weather.	Temperature.	Weather and temperature combined.
Maine	84.3	85.3	84.7	Arkansas	90.3	93.3	91.5
New Hampshire	87.3	82.0	85.2	Tennessee	95.0	90.0	93.0
Vermont	89.7	85.3	87.9	Kentucky	96.3	92.3	94.7
Massachusetts	88.3	87.0	87.8	Ohio	95.3	87.7	92.3
Rhode Island	94.3	79.0	88.2	West Virginia	92.7	70.3	83.7
Connecticut	92.7	83.3	88.9	Indiana	95.0	88.3	92.3
Eastern New York	92.7	83.3	88.9	Illinois	95.0	91.7	93.7
Western New York	91.7	94.0	92.6	Lower Michigan	91.3	88.0	90.0
Eastern Pennsylvania	90.3	84.3	87.9	Upper Michigan	85.7	83.3	84.7
Western Pennsylvania	88.3	87.0	87.8	Wisconsin	92.7	86.3	90.1
New Jersey	91.3	80.0	86.8	Minnesota	88.0	75.0	82.8
Delaware	92.7	79.3	87.3	Iowa	97.3	84.0	92.0
Maryland	89.0	76.7	84.1	Kansas	96.3	87.2	92.7
District of Columbia	89.3	71.7	82.3	Nebraska	96.0	74.7	87.5
Virginia	89.3	80.3	85.7	Missouri	96.7	88.7	93.5
North Carolina	97.3	83.3	91.7	Colorado	85.0	74.3	80.7
South Carolina	93.7	86.7	90.9	North Dakota	92.3	71.7	84.1
Georgia	90.0	85.0	88.0	South Dakota	93.3	73.0	85.2
Eastern Florida	90.7	96.7	93.1	Northern California	88.7	83.7	86.7
Western Florida	87.0	97.3	91.1	Southern California	93.7	89.3	91.9
Alabama	93.7	84.7	90.1	Oregon	89.7	67.0	80.6
Mississippi	93.3	85.0	90.0	Washington	88.0	68.7	80.3
Louisiana	90.7	91.0	90.8				
Texas	89.0	91.3	89.9	Monthly percentage	91.7	84.3	88.7

In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. The forecasts of temperature in districts east of the Rocky Mountains for September, 1891, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

FORECASTS FOR 48 AND 72 HOURS IN ADVANCE.

Percentages of verifications of forecasts made for second day in advance in October, 1891. Number of predictions made: weather, 409; temperature, 63. Percentages of verifications: weather, 91.6; temperature, 78.3; weather and temperature combined, 90.3.

Percentages of verifications of forecasts made for third day in advance. Number of predictions made: weather, 29; temperature, 3. Percentages of verifications: weather, 89.0; temperature, 100.0; weather and temperature combined, 89.7.

A statement of the percentage of justification of wind signals for October, 1891, will be published in the REVIEW for November, 1891.

FORECASTS FOR 24 HOURS IN ADVANCE.

The forecasts for districts east of the Rocky Mountains for October, 1891, were made by Professor H. A. Hazen, Weather Bureau, and those for the Pacific coast districts were made at San Francisco, Cal., by 1st Lieutenant John P. Finley, 15th Infantry.

Percentages of forecasts verified, October, 1891.

State.	Weather.	Temperature.	Weather and temperature combined.	State.	Weather.	Temperature.	Weather and temperature combined.
Maine	93.9	88.7	91.5	Arkansas	97.1	85.8	92.6
New Hampshire	91.3	88.4	90.1	Tennessee	97.4	87.4	93.4
Vermont	85.0	89.0	87.0	Kentucky	97.7	90.3	94.7
Massachusetts	90.0	89.0	89.5	Ohio	93.2	85.2	90.0
Rhode Island	88.1	88.4	88.2	West Virginia	93.9	81.6	89.6
Connecticut	86.5	86.4	86.5	Indiana	94.2	82.9	89.7
Eastern New York	90.0	87.9	89.0	Illinois	92.6	84.2	89.2
Western New York	89.0	87.7	88.3	Lower Michigan	87.1	81.3	84.6
Eastern Pennsylvania	88.1	82.9	85.5	Upper Michigan	84.8	77.7	82.0
Western Pennsylvania	90.0	81.6	86.6	Wisconsin	93.2	83.5	89.3
New Jersey	86.1	83.9	85.2	Minnesota	94.2	85.5	90.7
Delaware	87.4	90.6	89.0	Iowa	95.5	79.4	89.1
Maryland	87.7	88.1	87.9	Kansas	96.1	83.2	90.9
District of Columbia	85.8	87.1	86.3	Nebraska	96.1	79.4	89.4
Virginia	92.3	73.2	84.7	Missouri	94.5	85.5	90.9
North Carolina	94.8	68.4	84.2	Colorado	98.4	82.3	92.3
South Carolina	92.6	73.9	85.1	North Dakota	92.6	81.3	88.1
Georgia	97.1	70.6	86.5	South Dakota	93.2	81.3	88.4
Eastern Florida	92.3	85.8	89.7	Northern California	96.5	87.4	92.9
Western Florida	95.5	86.5	91.9	Southern California	95.7	89.0	94.8
Alabama	97.1	78.7	89.7	Oregon	88.1	88.1	88.1
Mississippi	90.8	77.4	89.0	Washington	89.7	83.5	87.2
Louisiana	95.5	91.6	93.9				
Texas	95.8	83.5	90.9	Monthly percentage	92.4	83.4	88.8

In determining the monthly percentage of weather and temperature combined, the Pacific coast states are not included. The forecasts of temperature in districts east of the Rocky Mountains for October, 1891, were made with reference to the maximum temperature alone; that is, a prediction of warmer or cooler indicated that the maximum temperature of the day designated would be higher or lower than the maximum of the previous day. The monthly percentage of weather and temperature combined is determined by multiplying the percentage of weather by 6, and the percentage of temperature by 4, and dividing their sum by 10.

STATE WEATHER SERVICES.

[Temperature in degrees Fahrenheit; precipitation, including melted snow, in inches and hundredths.]

The following extracts and summaries are republished from reports for October, 1891, of the directors of the various state weather services:

ALABAMA.

Temperature.—The mean was 4.1 below the normal; maximum, 96, at Salem, 2d; minimum, 23, at Valley Head, 23d and 28th; greatest monthly range, 66, at Brewton; least monthly range, 38, at Citronelle.

Precipitation.—The average was 2.24 below the normal; greatest monthly, 1.83, at Tuscumbia; least monthly, 0.00, at nearly all stations in the state.

Wind.—Prevailing direction, northwest—P. H. Mell, Observer, Weather Bureau, Auburn, director.

ARIZONA.

The month was exceedingly dry and warm.

Temperature.—Maximum, 102, at Yuma, 9th; minimum, 24, at Holbrook, 14th.

Precipitation.—The only precipitation reported was a trace at Mount Huachuca.

Wind.—Prevailing direction, southeast.—J. C. Hayden, Observer, Weather Bureau, Tucson, director.

ARKANSAS.

Temperature.—The mean was 1.1 below the normal; maximum, 92, at Hot Springs, Monticello, and Newport, 1st, at Black Rock, 24th, and at Lonoke, 25th; minimum, 27, at Devalls Bluff, 23d and 29th; greatest monthly range, 63, at Devalls Bluff; least monthly range, 41, at Winslow.

Precipitation.—The average was 1.51 below the normal; greatest monthly, 2.54, at Pine Bluff; least monthly, 0.00, at Texarkana and Mount Nebo.

Wind.—Prevailing direction, north.—M. F. Locke, Commissioner of Agriculture, Little Rock, director; F. H. Clarke, Observer, Weather Bureau, assistant.

CALIFORNIA.

Temperature.—Maximum, 98, at Needles, 7th, 9th, and 11th; greatest monthly range, 61, at Nordhoff; least monthly range, 23, at Stockton.

Precipitation.—Greatest monthly, 4.94, at Upper Mattole; least monthly, 0.00, at a number of stations.

Wind.—Prevailing directions, west and northwest.—J. A. Barwick, Observer, Weather Bureau, Sacramento, director.

COLORADO.

Temperature.—The month was slightly warmer than usual; maximum, 88, at Rocky Ford, 28th; minimum, 4, at Climax, 3d.

Precipitation.—The average was deficient; greatest monthly, 3.27, at Platora; 0.00 was reported at a number of stations.—W. S. Miller, Observer, Weather Bureau, Denver, director.

FLORIDA.

Temperature.—Maximum, 94, at Archer, 7th; minimum, 32, at Archer, 24th.

Precipitation.—The greatest amount of rain fell in the central and eastern portions of the peninsula, while but little is reported in the western counties; greatest monthly, 9.58, at Fort Meade; least monthly, 0.04, at Pensacola.—E. R. Demain, Observer, Weather Bureau, Jacksonville, director.

GEORGIA.

Temperature.—Maximum, 92, at Poulan, 5th; minimum, 30, at Gainesville, 28th; greatest monthly range, 60, at Poulan; least monthly range, 44, at Griffin and West Point.

Precipitation.—Greatest monthly, 2.46, at Savannah; least monthly, 0.00,

at a number of stations.—*Park Morrill, Observer, Weather Bureau, Atlanta, director.*

ILLINOIS.

Temperature.—The mean was 0.5 below the normal of the last 16 years; maximum, 95, at Greenville, 1st; minimum, 18, at Philo, 28th.

Precipitation.—The average was 2.05 below the normal; greatest monthly, 2.59, at Centralia; least monthly, 0.39, at Sandwich.

Wind.—Prevailing direction, northwest.—*John Craig, Observer, Weather Bureau, Springfield, director.*

INDIANA.

Temperature.—Maximum, 92, at Marengo, 1st; minimum, 18, at Mauzy, 28th; greatest monthly range, 69, at Point Isabel; least monthly range, 49, at Shelbyville.

Precipitation.—Greatest monthly, 2.17, at Rockville; least monthly, 0.28, at Vevay.

Wind.—Prevailing direction, northwest.—*Prof. H. A. Huston, La Fayette, director; C. F. R. Wappenhans, Observer, Weather Bureau, assistant.*

IOWA WEATHER AND CROP SERVICE.

Temperature.—Maximum, 92, at Bonaparte, 1st and 2d, and at Moor, 2d; minimum, 19, at Atlantic and Lafayette, 22d; greatest monthly range, 67, at Moor; least monthly range, 43, at Grinnell and Independence.

Precipitation.—Greatest monthly, 6.53, at Panama; least monthly, 0.85, at McCausland.—*J. R. Sage, Des Moines, director; G. M. Chappel, Observer, Weather Bureau, assistant.*

KANSAS.

Temperature.—Maximum, 98, at Columbus, 26th; minimum, 20, at Lebo, 22d; greatest monthly range, 73, at Lebo; least monthly range, 49, at Weskan.

Precipitation.—Greatest monthly, 6.14, at Concordia (near); least monthly, trace, at Page City.

Wind.—Prevailing direction, south.—*Prof. J. T. Lovewell, Topeka, director; T. B. Jennings, Observer, Weather Bureau, assistant.*

KENTUCKY.

Temperature.—The mean was 4.0 below the normal; maximum, 92, at Franklin, 1st; minimum, 21, at Harrodsburgh, 28th; greatest monthly range, 68, at Harrodsburgh and Princeton; least monthly range, 54, at Bowling Green.

Precipitation.—The average was about 2.25 below the normal; greatest monthly, 1.60, at Harrodsburgh; least monthly, 0.16, at Caddo and Pellville.

Wind.—Prevailing direction, southwest.—*Prof. E. H. Mark, Louisville, director; Frank Burke, Observer, Weather Bureau, assistant.*

LOUISIANA.

Temperature.—The mean was about 4.0 below the normal; maximum, 96, at Cameron, 3d; minimum, 26, at Winnsborough, 19th; greatest monthly range, 67, at Winnsborough; least monthly range, 26, at Port Eads.

Precipitation.—Greatest monthly, 3.07, at Jackson; least monthly, 0.00, at Homer, Liberty Hill, Winnsborough, Amite City, and Shell Beach.

Wind.—Prevailing direction, north.—*George E. Hunt, Observer, Weather Bureau, New Orleans, director.*

MARYLAND.

Temperature.—Maximum, 86, at Mount Saint Marys, 3d; minimum, 27, at McDonogh, 29th; greatest monthly range, 57, at Mount Saint Marys; least monthly range, 36, at Jewell.

Precipitation.—Greatest monthly, 4.83, at Barren Creek Springs; least monthly, 1.79, at Frederick.

Wind.—Prevailing direction, northwest.—*Dr. William B. Clark, Johns Hopkins University, Baltimore, director; Prof. Milton Whitney, Maryland Agricultural College, secretary and treasurer; C. P. Cronk, Observer, Weather Bureau, in charge.*

MICHIGAN.

Temperature.—The mean was 1.1 below the normal; maximum, 89, at Otsego, 2d; minimum, 9, at Crystal Falls, 31st; greatest monthly range, 69, at Gaylord; least monthly range, 38, at Bell Branch.

Precipitation.—The average was 1.45 below the normal; greatest monthly, 4.28, at Charlevoix; least monthly, 0.35, at Williamston.

Wind.—Prevailing directions, northwest and southwest.—*N. B. Conger, Observer, Weather Bureau, Detroit, director.*

MINNESOTA.

Temperature.—Maximum, 81, at Montevideo, 1st; minimum, 17, at Kinbrae, 27th; greatest monthly range, 57, at Montevideo; least monthly range, 43, at Duluth.

Precipitation.—Greatest monthly, 4.13, at Grand Meadow; least monthly, 0.64, at Pine River Dam.

Wind.—Prevailing direction, northwest.—*J. H. Harmon, Observer, Weather Bureau, Minneapolis, director.*

MISSISSIPPI.

Temperature.—The mean was 3.6 below the normal; maximum, 99, at Louisville, 1st; minimum, 26, at Vaiden, 23d; greatest monthly range, 72, at Louisville; least monthly range, 31, at Bay Saint Louis.

Precipitation.—The average was 1.92 below the normal; greatest monthly, 3.40, at Logtown; least monthly, 0.00, at a number of stations.

Wind.—Prevailing direction, north.—*R. B. Fulton, Observer, Weather Bureau, University, director.*

MISSOURI.

Temperature.—The average was 3.0 above the normal; maximum, 98, at Oak Ridge, 26th; minimum, 19, at Adrian, 14th.

Precipitation.—The average was 2.04 below the normal; greatest monthly, 1.98, at Appleton City; least monthly, 0.15, at Brunswick.—*Levi Chubbuck, Secretary of State Board of Agriculture, Columbia, director.*

NEBRASKA.

Temperature.—The mean was slightly below the normal; maximum, 92, at Superior; minimum, 17, at Kimball and Fort Niobrara.

Precipitation.—Greatest monthly, 6.40; at Fort Omaha; least monthly, 0.09, at Kimball.

Wind.—Prevailing direction, northwest.—*Prof. Goodwin D. Swezey, Crete, director; G. A. Loveland, Observer, Weather Bureau, assistant.*

NEVADA.

Temperature.—The mean was 1.2 below the normal; maximum, 88, at Wabnska, 10th; minimum, 0 (zero), at Elko and Stofiel, 12th; greatest monthly range, 81, at Elko; least monthly range, 42, at Hot Springs.

Precipitation.—The average was 0.50 below the normal; greatest monthly, 0.34, at Austin; least monthly, 0.00, at a number of stations.—*Prof. Charles W. Friend, Carson City, director; F. A. Carpenter, Observer, Weather Bureau, assistant.*

NEW ENGLAND METEOROLOGICAL SOCIETY.

Temperature.—The mean was 0.7 below the normal; maximum, 91, at Taunton (d), 4th; minimum, 10, at Berlin Mills, 29th; greatest monthly range, 76, at Stratford; least monthly range, 32, at Nantucket.

Precipitation.—The average was 0.24 above the normal; greatest monthly, 10.14, at Cotuit; least monthly, 0.51, at Lunenburg.

Wind.—Prevailing direction, northwest.—*Prof. William H. Niles, Boston, Mass., president; Prof. Winslow Upton, Providence, R. I., secretary; J. Warren Smith, Observer, Weather Bureau, assistant.*

NEW JERSEY.

Temperature.—The mean was 1.5 below the normal; maximum, 93, at Belvidere, 3d; minimum, 18, at Blairstown, 29th; greatest monthly range, 70, at Belvidere; least monthly range, 51, at Newton and Cape May C. H.

Precipitation.—The average was 2.89 below the normal; greatest monthly, 5.57, at Cape May C. H.; least monthly, 1.88, at Newton.

Wind.—Prevailing direction, northwest.—*E. W. McGann, Observer, Weather Bureau, New Brunswick, director.*

NEW MEXICO.

Temperature.—Maximum, 96, at Folsom, 19th; minimum, 13, at Coolidge, 31st; greatest monthly range, 69, at Coolidge; least monthly range, 39, at Santa Fé.

Precipitation.—Greatest monthly, 0.64, at Coolidge; least monthly, 0.00, at a number of stations.

Wind.—Prevailing direction, southwest.—*H. B. Hersey, Observer, Weather Bureau, Santa Fé, director.*

NEW YORK.

Temperature.—The mean was 0.8 below the normal; maximum, 91, at Wedgwood, 4th, and at Central Park, 18th; minimum, 14, at South Kortright, 29th; greatest monthly range, 70, at Wedgwood; least monthly range, 37, at Central Park.

Precipitation.—The average was 0.69 below the normal; greatest monthly, 8.35, at Peekskill; least monthly, 0.93, at West Point.

Wind.—Prevailing direction, west.—*Prof. E. A. Fuertes, Dean of the College of Civil Engineering, Cornell University, Ithaca, director; R. M. Harding, Observer, Weather Bureau, assistant.*

NORTH CAROLINA.

Temperature.—The mean was 4.0 below the normal; maximum, 92, at Chapel Hill, 5th; minimum, 22, at Bakersville, 29th; greatest monthly range, 64, at Chapel Hill; least monthly range, 34, at Southport.

Precipitation.—The average was 1.66 below the normal; greatest monthly, 7.74, at Hatteras; least monthly, 0.10, at Hendersonville.

Wind.—Prevailing direction, northwest.—*Dr. Herbert B. Battle, Raleigh, director; C. F. von Herrmann, Observer, Weather Bureau, assistant.*

NORTH DAKOTA.

Temperature.—The mean was about 2.0 above the normal; maximum, 80, at Fort Yates, 29th; minimum, 15, at Fort Buford, 3d; greatest monthly range, 62, at Woodbridge; least monthly range, 47, at Hope.

Precipitation.—The average was 0.30 above the normal; greatest monthly, 3.56, at Valley City; least monthly, 0.83, at Woodbridge.

Wind.—Prevailing direction, northwest.—*W. H. Fallon, Observer, Weather Bureau, Bismarck, director.*

OHIO.

Temperature.—The average was normal except in the northern section, where it was 1.0 above; maximum, 93, at Bangorville, 2d; minimum, 20, at Wauseon, Findlay, and Granville, 28th.

Precipitation.—The average was 0.89 below the normal; greatest monthly, 3.72, at Marion; least monthly, 0.54, at Demos.

Wind.—Prevailing direction, southwest.—*Prof. B. F. Thomas, Columbus, director; C. M. Strong, Observer, Weather Bureau, secretary and assistant.*

OREGON.

Temperature.—The mean was above the normal; maximum, 89, at Grants Pass, 7th, and at Lakeview, 8th; minimum, 11, at Burns, 30th.

Precipitation.—The average was 0.39 above the normal; snow fell at Beulah, Joseph, and on the high plateaus and mountains of Oregon.

Wind.—Prevailing direction, south.—*Hon. H. E. Hayes, Master State Grange, Portland, director; B. S. Pague, Observer, Weather Bureau, asst.*

PENNSYLVANIA.

Temperature.—The mean was 1.5 below the normal; maximum, 91, at Carlisle, 3d; minimum, 15, at Dyberry, 29th; greatest monthly range, 69, at Coatesville and Dyberry; least monthly range, 47, at Altoona.

Precipitation.—The average was 0.25 below the normal; greatest monthly, 4.46, at Selins Grove; least monthly, 0.84, at New Castle.

Wind.—Prevailing direction, northwest.—*Under direction of the Franklin Institute, Philadelphia; L. M. Dey, Observer, Weather Bureau, assistant.*

SOUTH CAROLINA.

Temperature.—Maximum, 92, at Greenwood, 5th; minimum, 28, at Kingstree and Kitchings Mills, 29th; greatest monthly range, 62, at Greenville and Kingstree; least monthly range, 42, at Port Royal.

Precipitation.—Greatest monthly, 4.20, at Charleston; least monthly, 0.18, at Spartanburgh.

Wind.—Prevailing directions, north and northeast.—*A. P. Butler, Observer, Weather Bureau, Columbia, director.*

SOUTH DAKOTA.

Temperature.—The mean was 2.0 above the normal; maximum, 95, at Forest City, 24th; minimum, 11, at Oelrichs, 2d; greatest monthly range, 75, at Forest City; least monthly range, 54, at Pierre.

Precipitation.—The average was 0.40 below the normal; greatest monthly, 1.88, at Aberdeen; least monthly, 0.34, at Rapid City.

Wind.—Prevailing direction, northwest.—*S. W. Glenn, Observer, Weather Bureau, Huron, director.*

TENNESSEE.

The most marked feature of the month was the small amount of rainfall.

Temperature.—The mean was 0.4 below the normal; maximum, 94, at Arlington, 1st, and with one exception, 1884, was the highest maximum on record for October; minimum, 24, at Austin and Hohenwald, 23d.

Precipitation.—The average was 1.80 below the normal, and was the least amount on record; the rainfall was greatest in the western part and least along the eastern border.—*J. B. Marbury, Observer, Weather Bureau, Nashville, director.*

TEXAS.

Temperature.—The mean was generally below the normal except in the west part and in the Panhandle; maximum, 98, at Dallas, 3d; minimum, 30, at Dallas, 8th; greatest monthly range, 68, at Dallas; least monthly range, 28, at Galveston.

Precipitation.—The average was below the normal except in the Panhandle; greatest monthly, 3.33, at Hartley; 0.00 was reported at a number of stations in the central part of the state.—*D. D. Bryan, Galveston, director; I. M. Cline, Observer, Weather Bureau, assistant.*

UTAH.

Temperature.—Maximum, 60, at Saint George, 9th and 10th; minimum, 12th, at Scofield, 30th and 31st; greatest monthly range, 67, at Beaver; least monthly range, 40, at Snowville.

Precipitation.—No appreciable rain fell after the 2d of the month; greatest monthly, 1.26, at Salt Lake City; least monthly, 0.00, at a number of stations.—*G. N. Salisbury, Observer, Weather Bureau, Salt Lake City, director.*

VIRGINIA.

Temperature.—The mean ranged from 2.0 to 3.0 below the normal; maximum, 92, at Richmond, 3d, and at Nottoway C. H., 5th; minimum, 22, at Big Stone Gap, 28th; greatest monthly range, 64, at Richmond; least monthly range, 43, at Salem.

Precipitation.—Greatest monthly, 11.55, at Birdsneest; least monthly, 0.24, at Bedford City.—*Dr. E. A. Craighill, Lynchburgh, director; J. N. Ryker, Observer, Weather Bureau, assistant.*

WASHINGTON.

Temperature.—Maximum, 89, at North Yakima, 7th; minimum, 18, at Waterville, 13th and 15th; greatest monthly range, 66, at North Yakima; least monthly range, 23, at East Sound.

Precipitation.—The average was in excess of the normal in the western part of the state, except at lower Sound points and Tatoosh Island, and it was deficient in the eastern part; greatest monthly, 10.06, at Neah Bay; least monthly, 0.16, at Baker City, Oregon.

Wind.—Prevailing direction, south.—*E. B. Olney, Observer, Weather Bureau, Olympia, director.*

WEST VIRGINIA.

Temperature.—Maximum, 95, at Morgantown, 3d; minimum, 24, at Parkersburgh and Pleasant Hill, 28th.

Precipitation.—Greatest monthly, 2.91, at Martinsburgh; least monthly, trace, at Kingwood.—*W. W. Dent, Observer, Weather Bureau, Parkersburgh, director.*

WISCONSIN.

Temperature.—Maximum, 90, at Beaver Dam, 1st, and at Juneau, 2d; minimum, 14, at Hayward, 27th.

Precipitation.—In the extreme northwest, northeast, and southern parts of the state there was a deficiency of from 1.00 to 2.00; elsewhere it was above the normal; greatest monthly, 4.29, at Whitehall; least monthly, 0.18, at Cadiz.—*W. L. Moore, Observer, Weather Bureau, Milwaukee, director.*

WYOMING.

Temperature.—The mean was about normal; maximum, 88, at Casper, 26th, and at Fort Fetterman, 17th; minimum, 9, at Saratoga, 31st; greatest monthly range, 69, at Fort Fetterman; least monthly range, 51, at Fort McKinney and Laramie.

Precipitation.—The average was below the normal; greatest monthly, 1.50, at Lander; least monthly, 0.00, at Wheatland.

Wind.—Prevailing direction, northwest.—*E. M. Ravenscraft, Observer, Weather Bureau, Cheyenne, director.*

CONTRIBUTIONS AND ORIGINAL ARTICLES.

FLUCTUATIONS OF TEMPERATURE AND PRESSURE AT THE BASE AND SUMMIT OF MOUNT WASHINGTON.

[By Prof. H. A. HAZEN, Weather Bureau.]

The last chart in this REVIEW contains a continuation of the curves previously published, and completes these fluctuations for the months of January, February, and March from 1871 to 1886, or for 16 years.

1st. An interesting question arises as to the effect of the mountain upon the temperature of the air. The curves seem to show that if there is any effect it is exceedingly slight and cannot influence the maximum and minimum points, except to prevent the extreme rise and fall in warm and cold waves that might occur in the free air. In other words, the temperature in a warm wave might not rise quite so high if the summit were cooler than the air and might not fall quite so low in a cold wave if the summit rocks were warmer than the air. It would appear that, under any and all circumstances, the dips and rises in the fluctuations of temperature at the summit would not be shifted appreciably in time of occurrence by the presence of the mountain.

2d. Is the diurnal range entirely eliminated from the base curve? It will be noted that the base curve shows a great many minor fluctuations of temperature not to be found in the summit curve, and a close inspection will show that many of these are due to the diurnal range. For example, with a clouded sky the diurnal range has been over compensated, since the clouds prevent

radiation at night and insolation by day. These cases, however, are very few and the effects are not sufficiently strong to obliterate the larger fluctuations.

3d. As was to be expected the fluctuations of pressure are almost exactly identical at the base and summit. Occasionally the change in temperature at the summit has preceded that in pressure to such an extent as to cause the pressure phases to lag behind at the summit.

4th. As has been noted before, the most marked characteristic in the temperature curves has been their closeness at base and summit, indicating, apparently, a general effect not essentially modified by local causes. The earlier change at the summit in both cold waves and hot waves is remarkable and does not seem to be due, as has been suggested, to the greater rapidity of the upper current which carries the warm or cold air from the west more rapidly to the summit than to the base. It will be seen that any effect of this kind would be very quickly obliterated by the motion of the air. Again, while on some accounts warm air from the earth's surface might produce such an effect, it would seem that cold air could not have this source, but must come from above.

Observations are much needed at very much greater heights, even up to 30,000 feet, in order to settle these and many other questions. These curves have been published in order to bring the material contained in them before others, and it is hoped that many will be interested in making them a special study.